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XXI. *An Account of a remarkable Transposition of the Viscera.*
 By Matthew Baillie, M. D. In a Letter to John Hunter,
Esq. F. R. S.

Read May 8, 1788.

TO JOHN HUNTER, ESQ. F. R. S.

DEAR SIR,

A VERY singular variety having occurred lately in the structure of the human body, I beg leave to communicate an account of it by your means to the Royal Society, if you should think it worthy of their notice. It happens by a very uncommon concurrence of circumstances, that while I am naturally led by the ties of affinity to apply to you upon this occasion, I can gratify my pride by thinking it is at the same time to the person who is possessed of the first reputation for his unwearied researches in one of the most extensive, as well as interesting, parts of the system of nature.

I am, &c.

M. BAILLIE.

Great Windmill-street,
 April 12, 1788.

THERE

THERE is nothing which tends more to illustrate the powers and the wisdom of nature than the investigation of the structure of animals. We there find a most wonderful delicacy of mechanism, and exquisitely adapted to a variety of purposes. This, however, is not to be better seen by following nature in her common tract than by observing her wanderings. In these she often shews more particularly the extent of her powers, and throws light on her ordinary plans. It is such circumstances which give importance or value to the observation of singular phænomena. The variety in animal structure, an account of which I have the honour of presenting to this learned Society, is a complete transposition in the human subject of the thoracic and abdominal viscera to the opposite side from what is natural.

It is so extraordinay as scarcely to have been seen by any of the most celebrated anatomists, and indeed has been but very generally noticed at all. The circumstance has been mentioned, but it has not been particularly described so as to make it thoroughly known, or to establish its certainty. It was hanging in the minds of many as doubtful, whether such a variety did really exist. There is one circumstance that attends the account of the present case, which has not always happened in the record of singular phænomena, *viz.* that it has been examined by physicians and surgeons of the first reputation in this large town, and has been in some measure open to the gratification of public curiosity. Such a circumstance (were it necessary) would give the stamp of authenticity to appearances even much farther removed from the ordinary plans of nature.

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I have been at the pains to consult many authors upon this subject, but with very little satisfaction. I shall not enter into a detail of what I have met with in the course of these researches, but shall briefly notice, that when any lusus of this sort is mentioned, it is commonly in a single sentence or two, and the transposition is not marked as universal, or it is a change in the situation of some viscus from disease. In short, I have only found this singular lusus naturæ described by CATTIERIUS, M. MERY, and M. DAUBENTON; but by none of them is it sufficiently particular. Enough has been said to point out that they had exactly met with the same sort of monstrosity; but many circumstances have been omitted, which I hope will be supplied by the present account, which I proceed immediately to lay before the Society.

The person who is the subject of this Paper was a male, near forty years of age, somewhat above the middle stature, and of a clean active shape. He was brought for dissection in the common way to Windmill-street. Upon opening the cavity of the thorax and abdomen, the different situation of the viscera was so striking as immediately to excite the attention of the pupils who were engaged in dissecting it; and Mr. CRUIKSHANK, as well as myself, were very soon informed of the singularity. We were much surprized as well as pleased with the appearance, and I began immediately to examine every part of the change with considerable attention: for this purpose, after desiring a drawing to be made of the appearances as they were found upon opening the body, I next day injected it. The repeated dissections have furnished various views, which are represented faithfully by drawings, and which I hope will enable me to give a tolerably distinct account of this singular lusus naturæ. I shall not enter in my description into unnecessary minutiae: this would render the

Paper less suited to the Society, would not convey more information to persons thoroughly acquainted with anatomy, and would rather tend to obscure what is more important to those who have not given so much attention to subjects of this nature. It may not be improper to observe, that, besides the transposition in the viscera of this person, there are several peculiarities which sometimes occur. I have taken notice of them in my description, although they are entirely independent of the transposition.

Description of the thorax.

The mediastinum, or anterior duplicature of the pleura separating the two cavities of the chest from each other, was found to incline obliquely downwards to the right-side fully as much as it does commonly to the left-side of the chest. The pericardium too inclined obliquely to the right-side. On pressing it gently away from the lungs the phrenic nerves came distinctly into view, in their common situation; but the right phrenic nerve ran more obliquely, and was longer than the left. The lung upon the right-side was divided by a single oblique fissure into two lobes, having at the same time a deficiency opposite to the apex of the heart; and the lung on the left-side was divided into three lobes, exactly contrary to what is found in ordinary cases.

On opening the pericardium the apex of the heart was found to point to the right-side nearly opposite to the fifth rib, and its cavities as well as large vessels were completely transposed. What are commonly called the right auricle and ventricle were situated on the left-side, and the left auricle and ventricle on

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the right. The pulmonary artery ascended towards the right-side of the chest. The aorta was also directing its arch to the right; and the vena cava superior, as well as inferior, were seen opening into their auricle on the left-side of the spine. There was nothing remarkable in the size or general figure of the heart.

On the outside of the pericardium the transposition of the larger vessels was very striking. The longer sub-clavian vein was passing from the left-side obliquely to the right before the branches which are sent off from the arch of the aorta. The left carotid and sub-clavian arteries were found to arise from the arch of the aorta by one common trunk; the right carotid and sub-clavian separately.

In the duplicature of the pleura behind, or what may be called the posterior mediastinum, there was a change corresponding to what we have already described. The descending aorta was found passing on the right side of the spine. The œsophagus was before it, inclining more and more to the right towards its lower extremity, and it at length perforated the diaphragm somewhat on the right-side of the spine*. The thoracic duct was seen in the middle between the descending aorta and the vena azygos in some places forming a plexus of small branches, in another dividing itself into two branches, which afterwards re-united in a common trunk, and at length climbing up to terminate in the angle between the jugular and sub-clavian veins on the right-side of the body. The recurrent nerve of the parvagum on the right-side passed round the beginning of the descending aorta, and on the left passed round

* The vena azygos was on the left-side of the spine opening in the common way into the vena cava superior, which we formerly mentioned to be also transposed in its situation.

the common trunk of the carotid and sub-clavian arteries. The large intercostal nerves being exactly under the same circumstances on each side, it was impossible there could be any transposition in them. It appears then, from the foregoing description, that every thing admitting of such a change was completely transposed in the thorax.

Of the abdomen.

The liver was situated in the left hypochondriac region, the small lobe being towards the right, and the great lobe in the left-side. The ligaments uniting it to the diaphragm corresponded to this change, the right transverse ligament being longer, and the left being shorter, than usual. The suspensory ligament could undergo little change, except being pushed to the left-side along with the liver. On pressing upwards the liver, so as to exhibit its posterior and under surface, the gall bladder was seen on the left-side preserving its proper relative situation to the great lobe of the liver, and the vessels of the portæ were found upon dissection to be transposed corresponding to the change of circumstances. The hepatic artery was found climbing up obliquely from the right towards the left, before the lobulus spigelii, and entered at the portæ into the substance of the liver by two or three branches on the right of the other vessels. The *ductus communis cholidochus* was on the left of the other vessels, being formed from the *ductus hepaticus* and *ductus cysticus* in the common way, and it passed obliquely downwards on the left, to terminate in the duodenum. What was most remarkable, of which indeed I never saw or heard of any instance before, it terminated in the fore-part of the duodenum. The *væna portarum* passed behind the hepatic

artery and ductus communis cholidochus, ascending obliquely towards the left-side.

The spleen was situated in the right hypochondriac region, adhering to the diaphragm in the common way. What was very remarkable was, there being three spleens, nearly of the size of a pullet's egg, found adhering to the larger spleen by short adhesions, besides two other still smaller spleens which were involved in the epiploon at the great end of the stomach. I never saw so many small spleens in any one subject. The pancreas was found on the right-side behind the stomach, running obliquely from the spleen to the curvature of the duodenum, and had its duct entering in common with the ductus communis cholidochus into the cavity of that intestine. The splenic vessels were passing along the upper edge of the pancreas to the right-side, corresponding to the change of situation in the pancreas and spleen.

The stomach was situated on the right-side, partly hid by the small lobe of the liver passing to the left, and terminating in the pylorus, rather on the left side of the spine. The duodenum took a most singular course; it first passed to the right-side, behind the small end of the stomach; it then turned upon itself, towards the left-side; it afterwards took its proper sweep to the right-side, passing behind the superior mesenteric artery and mesaraica major vein. The mesentery began to be formed on the right-side, instead of the left, as in ordinary cases. The ilium terminated in the great intestine on the left-side, and there was in it a diverticulum of considerable size, a lufus not unfrequently occurring. The cæcum was situated on the left psoas magnus and iliacus internus muscles. The transverse arch of the colon passed from the left to the right-

side of the body, and the sigmoid flexure crossed over the right psoas, to get into the cavity of the pelvis.

The kidneys had their vessels transposed, as we shall remark more particularly afterwards; the renal capsules had undergone no change, as no variety could be produced by a transposition.

The aorta passed between the crura of the diaphragm into the cavity of the abdomen, and adhered in its course to the spine on the right-side of the vena cava inferior. Its branches were directed in their course corresponding to the peculiar situation of the viscera. The splenic and coronary arteries were passing to the right-side, and the hepatic artery obliquely to the left. The superior and inferior mesenteric arteries were directed to the right-side. There was no change in the spermatic arteries, any transposition in the testicles (if such a thing could take place) not being capable of affecting them. The lumbar arteries could also undergo little change, except that the left lumbar arteries must necessarily, from the peculiar situation of the aorta, be the longest. The vena cava inferior perforated the tendinous portion of the diaphragm, and adhered in its course to the spine on the left-side of the aorta.

The right emulgent vein was much longer than usual, passing from the right kidney before the aorta to terminate in the vena cava superior; and the left emulgent much shorter, passing from the left kidney to the vena cava, which was situated on the left side of the spine. The right spermatic vein was found to open into the right emulgent, and the left into the vena cava inferior, about an inch under the left emulgent. The vena portarum was changed from its natural course, passing obliquely upwards to the left-side, and its large branches, *viz.* the vena splenica, mesaraica major and minor, were all directed towards the right-side of the spine.

There was no change in the intercostal nerve within the cavity of the abdomen; nor does it seem to be capable of being affected by any transposition of parts. We see then, that there was a complete transposition of the abdominal viscera, each of them preserving its proper relative situation to the others.

I examined the brain, organs of sense, of generation, the muscles and blood vessels of the extremities, but found nothing in them remarkable. Indeed, I had no expectation of it; for all these parts are perfectly independent of thoracic or abdominal viscera; but I did it to satisfy myself and the curiosity of others, who might wish to put such a question, or have such a question arising in their minds.

The person seems to have used his right-hand in preference to his left, as is usually the case, which was readily discovered by the greater bulk and hardness of that hand, as well as the greater fleshiness of the arm. It was not to be expected he should be left-handed; but I mention this circumstance too, with a view to satisfy a curiosity which I know has been excited in many who have heard of this lusus.

I have been at considerable pains to learn something of the history of this person during life; but the particulars I have heard are applicable only to the circumstances of common men, having no connection with singularity of structure, and therefore, I think, it would be abusing the time of the Society to give any account of them. One thing it may be right to mention is, that the person, while alive, was not conscious of any uncommon situation of his heart; and that his brother, whom I have seen, has his heart pointing to the left-side as in ordinary cases. Indeed, there was little reason to expect that we should meet with any thing particular in the account of his

life. His health could not be affected by such a change of situation in his viscera; nor could there arise from it any peculiar symptoms of disease. Still less could there be any connection between such a change and his dispositions, or external actions. He might have known that his heart was directed towards the right-side; but if we consider how little every person, especially those of the lower class, are attentive to circumstances not very palpable, it was scarcely to be expected he should know of it. If I had met with any thing in his life which was at all referable to the singularity of structure, I should have been very glad to have gratified the public curiosity by giving an account of it *.

Every singular phænomenon in animal structure is worth remarking, even if it should not lead immediately to any useful observation; but it becomes more important if it should tend to throw any light upon the principles of nature in the formation of animals. It is reasonable to think, that nature should follow some general plan in her operations. There is some effect which she has in view, and she will generally employ the same means to produce it. In the structure of any animal, her view is to form such a combination of parts as to render the animal fitted for certain purposes. She will commonly form the same combination where the same purposes are to be served; or, in other words, there will be the same structure in the same species of animals. The same effect however may be produced, without a strict adherence to the employment of the same means, as we find to be the case

* Since the above lusus has occurred, I have seen, in the possession of Mr. PAYNE, Surgeon, a foetus at the full time, with the viscera transposed. In the Anatomical Collection of Christ Church, in Oxford, there is a heart transposed that had belonged to a very small foetus; but the foetus itself is not preserved.

in all human inventions, and therefore there is no reason why nature should not sometimes deviate from her ordinary plans. Accordingly we find there is much variety in animal structure; but this does not commonly affect the animal functions. Under this restriction the variety is so great in the appearances of every part of an animal, that it is almost impossible to examine any two animals of the same species without remarking many differences.

In the bony compages of an animal we find little variety in the extremities of bones where there is the apparatus of a joint, because a particular shape is best adapted to a particular kind or latitude of motion. In other parts of the bones, where a difference of features is not material, there is great variety, as in the foramina, depressions, ridges, and sutures of bones.

The same general rule will apply to variety in muscles. The principal object is a certain insertion near a joint, so as to give a determined direction of motion. With respect to such insertions, there is, comparatively speaking, little variety; but there is a great difference in the bodies and connections of muscles, which have no share in the regulation of the motion.

There is no part of an animal where there is a greater latitude of variety than in the distribution of blood vessels. The reason of it is very obvious. The only object in the distribution of blood vessels is, to carry blood to every part of the body and bring it back to the heart. The parts of an animal, in order to be supported, must be visited by successive changes of fresh blood; but it surely cannot be an object of importance whether the blood passes by one rout or another. Hence the variety in blood vessels is extremely great. Still, however, there is a method in the deviations of nature, so that they may

may be marked or noted, the same varieties occurring in different animals.

It cannot be at all important to the function of a viscus, whether it be in one mass, or in separate portions. The structure being the same, the same action will take place. Hence we often find the two kidneys joined together, forming one mass; and not unfrequently two or three spleens besides the common one. Neither can it be important, whether a viscus should always be of the same shape, because its functions do not depend on shape, but on structure: we find accordingly, in this particular, much variety.

There are many of the viscera which are connected together in their functions, or by the junction of large blood-vessels, in such a way as to require nearly the same relative situation among themselves. This becomes also necessary in order to preserve the general shape of the animal. Accordingly we find, that when any important viscus is changed in its situation, it affects the situation of other viscera, requiring in them a similar change. We saw in the person who is the subject of this Paper, that a change in the situation of the heart and liver was accompanied with a change of situation in the stomach, spleen, pancreas, and in short the whole abdominal viscera. This, however, is a great deviation in nature; for it is nothing less than changing almost the whole vital system in an animal, and therefore it rarely happens.

In such a change it does not appear, that the functions can be affected; as they depend on structure and situation, which are both preserved. Hence the person who is the subject of this Paper arrived at the age of maturity, and might have continued to live to an extreme old age.

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The human machine might have been constructed in this way generally, and under such circumstances what is now called the natural situation of parts would have been as singular as the present phænomenon.

There appears to be less variety in the nervous system of animals of the same species than in most parts of the body. There is scarcely any difference in the appearance of the brain, and much less in the distribution of the nerves than of the blood-veffels.

There is also little variety in the organs of fense: perhaps the mechanism in both these is nicer, so that a considerable deviation would interfere with their peculiar fuctions.

The most common great deviations which nature produces in the structure of an animal are various kinds of monstrosity, by which the animal becomes often unfit for continuing its existence. Why nature should in its greater deviations fall into a very imperfect formation, much below the standard of her common work, does not appear very obvious.

It seems that there might have been many varieties where the fuctions could have been preserved. Perhaps it is with a view to check the propagation of great varieties, so as to preserve an uniformity in the same species of animals.

It has been much agitated, whether monstrosities depend on the original formation, or are produced afterwards in the gradual evolution of an animal.

This does not appear to be a question of much importance; nor perhaps can it be absolutely determined. But upon the whole it is more reasonable to think, that the same plan of formation is continued from the beginning, than that at any subsequent period there is a change in that plan.

It may be observed, that it is exactly the same creative action which produces the natural structure, or any deviation from it; for in cases of deviation the action is either carried too far, ceases too soon, or is diverted into uncommon channels. This will explain the various kinds of monstrosity from redundancy, deficiency, or transposition of parts.

